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(54) **SYSTEMS AND METHODS FOR RAPID DELIVERY OF TIERED METADATA**

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G06F 17/30	(2006.01)
G06Q 10/10	(2012.01)
H04L 29/08	(2006.01)

(52) **U.S. Cl.**

CPC ***G06F 17/30312*** (2013.01); ***G06Q 10/10*** (2013.01); ***H04L 67/10*** (2013.01); ***H04L 67/325*** (2013.01); *Y10S 707/943* (2013.01); *Y10S 707/95* (2013.01)

(58) **Field of Classification Search**

CPC Y10S 707/943; G06F 17/30312

USPC 707/791, 794

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,163,131	A	11/1992	Row et al.	
5,862,325	A *	1/1999	Reed	H04L 29/06 704/270.1
6,405,162	B1	6/2002	Segond et al.	
6,769,018	B2	7/2004	Gagnon	

(Continued)

OTHER PUBLICATIONS

International Search Report from corresponding Application No. PCT/US2009/05118 (Oct. 30, 2009).

(Continued)

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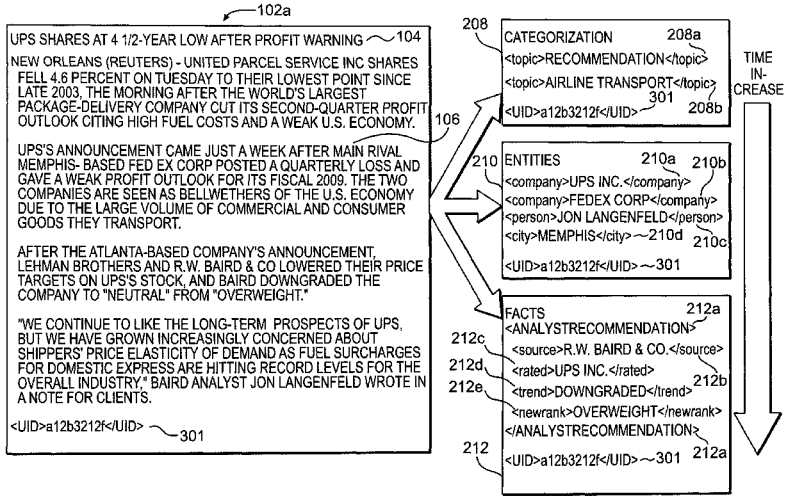
(57) **ABSTRACT**

In one embodiment of the present invention, a computer-implemented method includes receiving a set of alphanumeric information on a single storage device. First, second and third sets of metadata that are different from each other and that are associated with different subsets of the alphanumeric information are generated by processing the alphanumeric information using first, second, and third criteria, respectively. The first set of metadata is transmitted to a user computer at a first time, the second set of metadata is transmitted to the user computer at a second time subsequent to the first time, and the third set of metadata is transmitted to the user computer at a third time subsequent to the second time. The first, second, and/or third sets of metadata can cause the automated transmission of an alert.

10 Claims, 8 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

7,003,522	B1	2/2006	Reynar et al.	
7,032,174	B2	4/2006	Montero et al.	
7,124,354	B1	10/2006	Ramani et al.	
7,146,383	B2	12/2006	Martin et al.	
7,305,415	B2	12/2007	Vernau et al.	
7,398,324	B2	7/2008	Brennan et al.	
7,433,876	B2	10/2008	Spivack et al.	
7,555,455	B2	6/2009	Agarwal et al.	
7,853,478	B2	12/2010	Donahue et al.	
8,001,129	B2 *	8/2011	Arumainayagam	G06F 17/30011 707/749
2002/0108115	A1	8/2002	Palmer	
2003/0135826	A1	7/2003	Dozier	
2005/0015709	A1 *	1/2005	Lavoie	G06Q 40/00 715/256
2005/0235031	A1	10/2005	Schneider et al.	
2005/0262428	A1	11/2005	Little et al.	
2006/0036461	A1	2/2006	Chuah et al.	
2006/0242489	A1 *	10/2006	Brockway	G06F 17/30309 714/718
2006/0259781	A1	11/2006	Saeki et al.	
2007/0067211	A1 *	3/2007	Kaplan	G06Q 10/04 705/7.31
2007/0118803	A1	5/2007	Walker et al.	
2007/0233585	A1 *	10/2007	Ben Simon	G06Q 40/00 705/35
2008/0021895	A1	1/2008	Stevenson et al.	
2008/0028286	A1	1/2008	Chick	
2008/0072054	A1 *	3/2008	Choi	H04L 9/3239 713/176
2008/0127289	A1	5/2008	Julia et al.	
2008/0183639	A1 *	7/2008	DiSalvo	G06Q 40/02 705/36 R
2008/0275859	A1	11/2008	Griffith	
2008/0300984	A1	12/2008	Li	
2008/0306913	A1	12/2008	Newman et al.	
2009/0055405	A1	2/2009	Brier et al.	

OTHER PUBLICATIONS

Written Opinion of the International Searching Authority from corresponding Application No. PCT/US2009/05118 (Oct. 30, 2009).

"Best Practices for Structural Metadata," Version 1, Yale University Library, Jun. 1, 2008.

Non-Final Office Action issued on Apr. 13, 2011 in U.S. Appl. No. 12/453,397, filed May 8, 2009.

Final Office Action issued on Aug. 17, 2011 in U.S. Appl. No. 12/453,397, filed May 8, 2009.

International Search Report from Application No. PCT/US2010/001368 (Jun. 24, 2010).

* cited by examiner

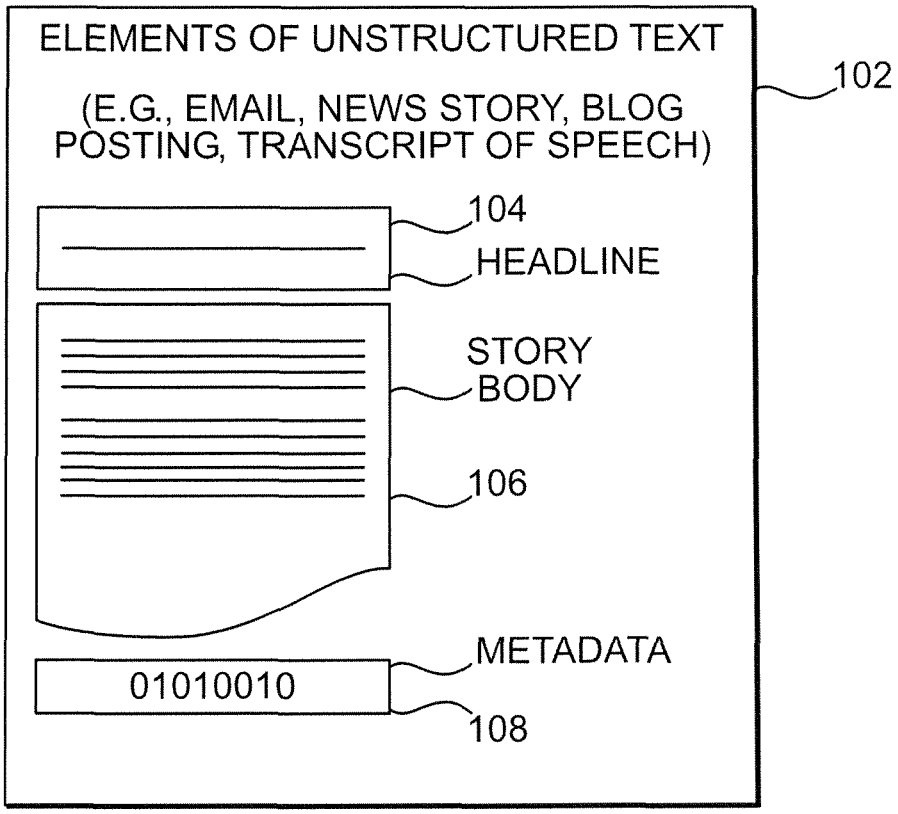

ELEMENTS OF UNSTRUCTURED TEXT
(E.G., EMAIL, NEWS STORY, BLOG POSTING, TRANSCRIPT OF SPEECH)
102
104
HEADLINE
STORY BODY
106
METADATA
01010010
108

FIG. 1

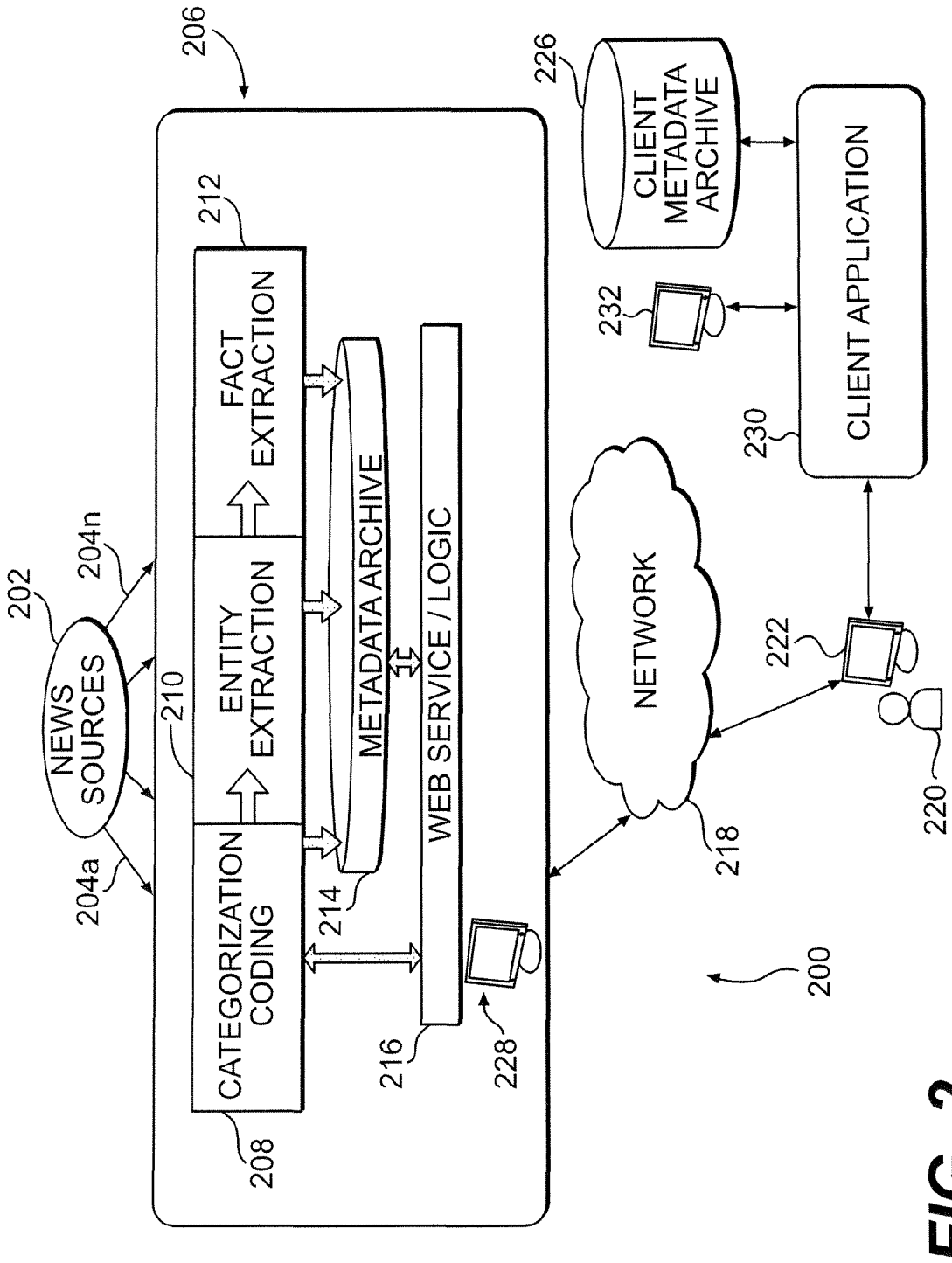
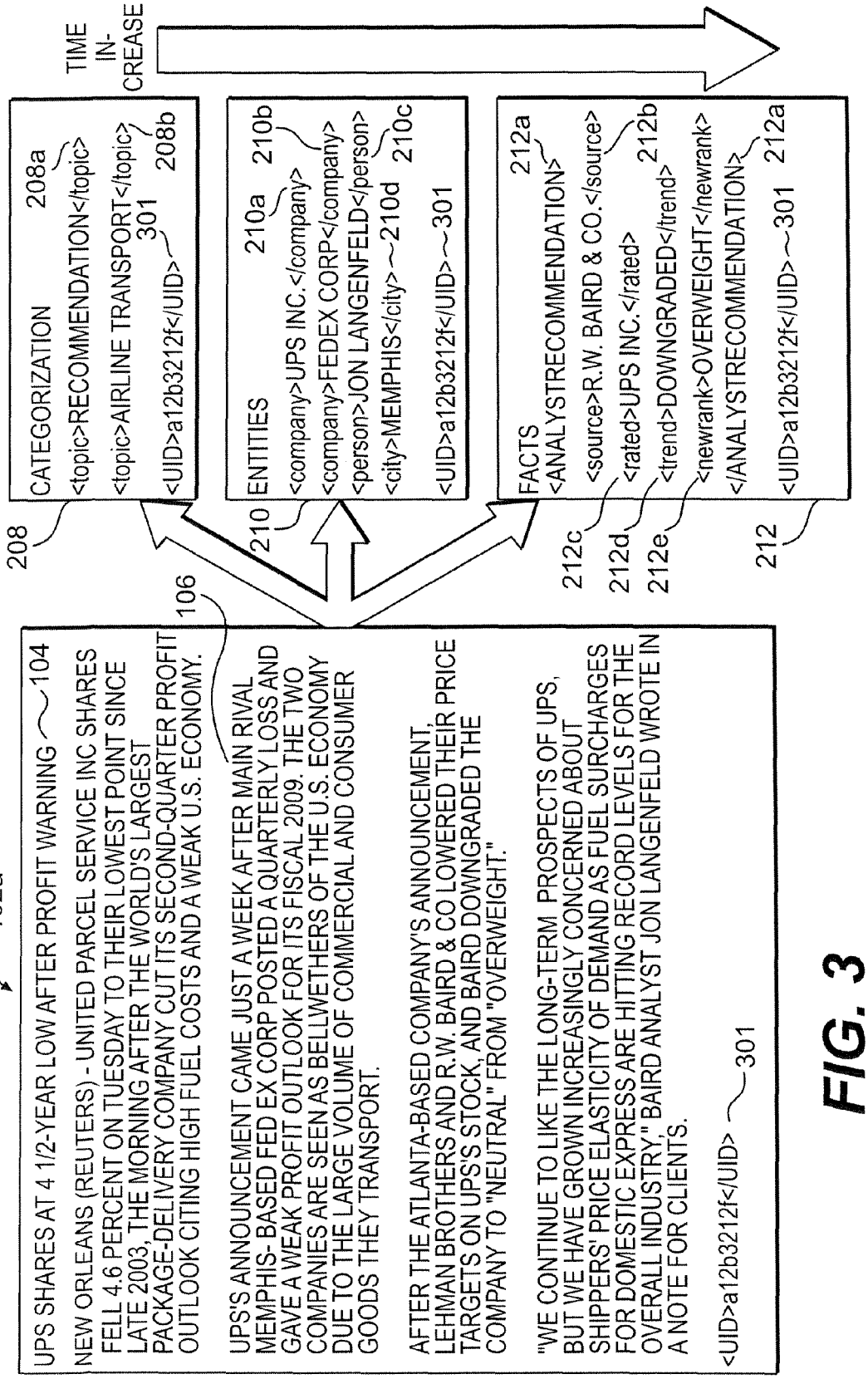

206
212
FACT EXTRACTION
ENTITY EXTRACTION
CATEGORIZATION CODING
210
208
METADATA ARCHIVE
214
WEB SERVICE / LOGIC
216
228
NEWS SOURCES
202
204n
204a
NETWORK
218
200
CLIENT METADATA ARCHIVE
226
CLIENT APPLICATION
230
232
222
220

FIG. 2


102a
UPS SHARES AT 4 1/2-YEAR LOW AFTER PROFIT WARNING 104
NEW ORLEANS (REUTERS) - UNITED PARCEL SERVICE INC SHARES FELL 4.6 PERCENT ON TUESDAY TO THEIR LOWEST POINT SINCE LATE 2003, THE MORNING AFTER THE WORLD'S LARGEST PACKAGE-DELIVERY COMPANY CUT ITS SECOND-QUARTER PROFIT OUTLOOK CITING HIGH FUEL COSTS AND A WEAK U.S. ECONOMY.
106
UPS'S ANNOUNCEMENT CAME JUST A WEEK AFTER MAIN RIVAL MEMPHIS- BASED FED EX CORP POSTED A QUARTERLY LOSS AND GAVE A WEAK PROFIT OUTLOOK FOR ITS FISCAL 2009. THE TWO COMPANIES ARE SEEN AS BELLWETHERS OF THE U.S. ECONOMY DUE TO THE LARGE VOLUME OF COMMERCIAL AND CONSUMER GOODS THEY TRANSPORT.
AFTER THE ATLANTA-BASED COMPANY'S ANNOUNCEMENT, LEHMAN BROTHERS AND R.W. BAIRD & CO LOWERED THEIR PRICE TARGETS ON UPS'S STOCK, AND BAIRD DOWNGRADED THE COMPANY TO "NEUTRAL" FROM "OVERWEIGHT."
"WE CONTINUE TO LIKE THE LONG-TERM PROSPECTS OF UPS, BUT WE HAVE GROWN INCREASINGLY CONCERNED ABOUT SHIPPERS' PRICE ELASTICITY OF DEMAND AS FUEL SURCHARGES FOR DOMESTIC EXPRESS ARE HITTING RECORD LEVELS FOR THE OVERALL INDUSTRY," BAIRD ANALYST JON LANGENFELD WROTE IN A NOTE FOR CLIENTS.
<UID>a12b3212f</UID> 301
208
CATEGORIZATION 208a
<topic>RECOMMENDATION</topic>
<topic>AIRLINE TRANSPORT</topic>
<UID>a12b3212f</UID> 301 208b
210
ENTITIES 210a 210b
<company>UPS INC.</company>
<company>FEDEX CORP</company>
<person>JON LANGENFELD</person>
<city>MEMPHIS</city> 210d 210c
<UID>a12b3212f</UID> 301
212
FACTS 212a
<ANALYSTRECOMMENDATION>
<source>R.W. BAIRD & CO.</source> 212c
<rated>UPS INC.</rated> 212d
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</ANALYSTRECOMMENDATION> 212a
<UID>a12b3212f</UID> 301
TIME IN-CREASE

FIG. 3

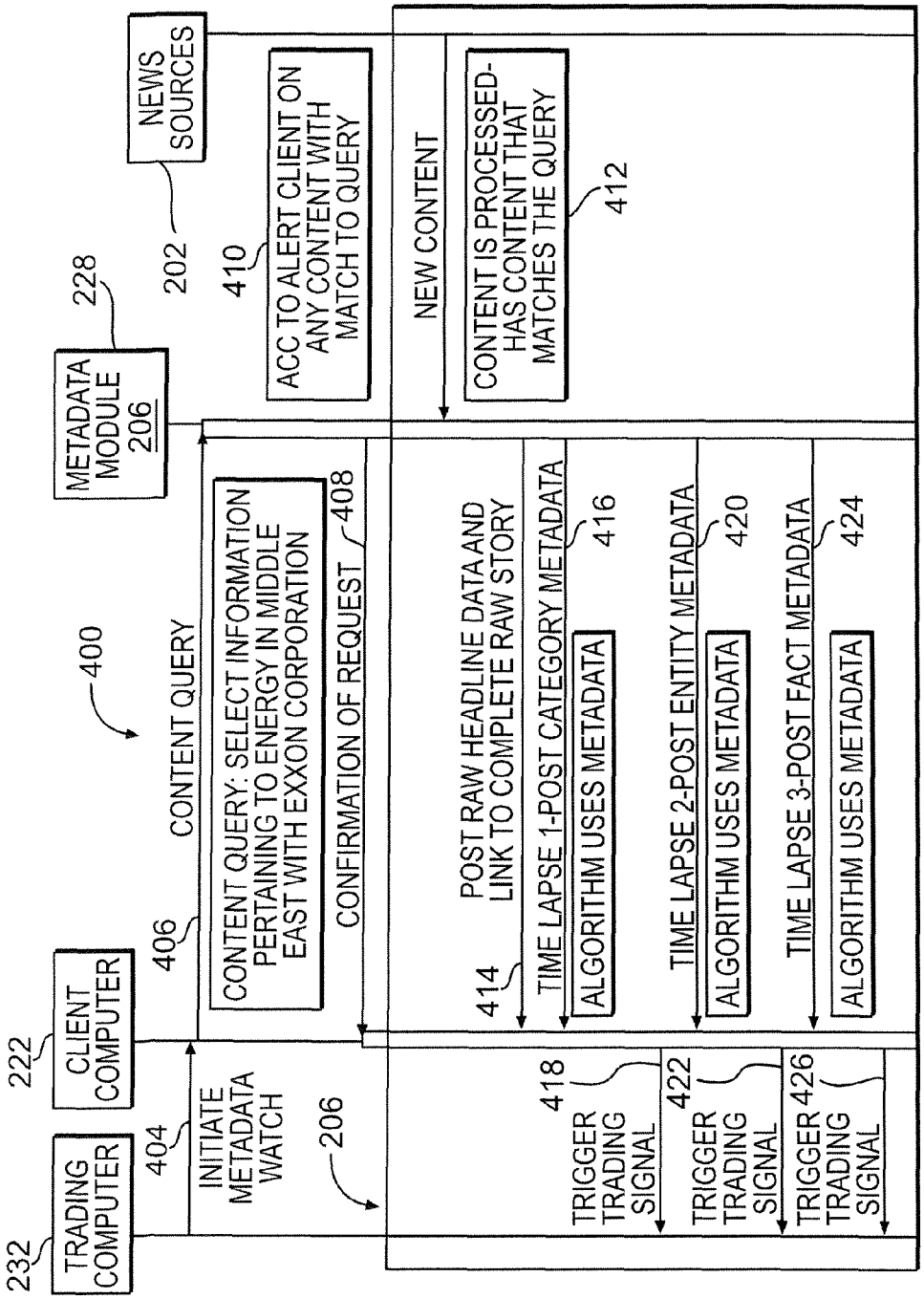
232
TRADING COMPUTER
222
CLIENT COMPUTER
228
METADATA MODULE 206
202
NEWS SOURCES
400
404
INITIATE METADATA WATCH
406
CONTENT QUERY
CONTENT QUERY: SELECT INFORMATION PERTAINING TO ENERGY IN MIDDLE EAST WITH EXXON CORPORATION
408
CONFIRMATION OF REQUEST
410
ACC TO ALERT CLIENT ON ANY CONTENT WITH MATCH TO QUERY
NEW CONTENT
CONTENT IS PROCESSED-HAS CONTENT THAT MATCHES THE QUERY
412
206
414
POST RAW HEADLINE DATA AND LINK TO COMPLETE RAW STORY
TIME LAPSE 1-POST CATEGORY METADATA
416
ALGORITHM USES METADATA
TIME LAPSE 2-POST ENTITY METADATA
420
ALGORITHM USES METADATA
TIME LAPSE 3-POST FACT METADATA
424
ALGORITHM USES METADATA
418
TRIGGER TRADING SIGNAL
422
TRIGGER TRADING SIGNAL
426
TRIGGER TRADING SIGNAL

FIG. 4

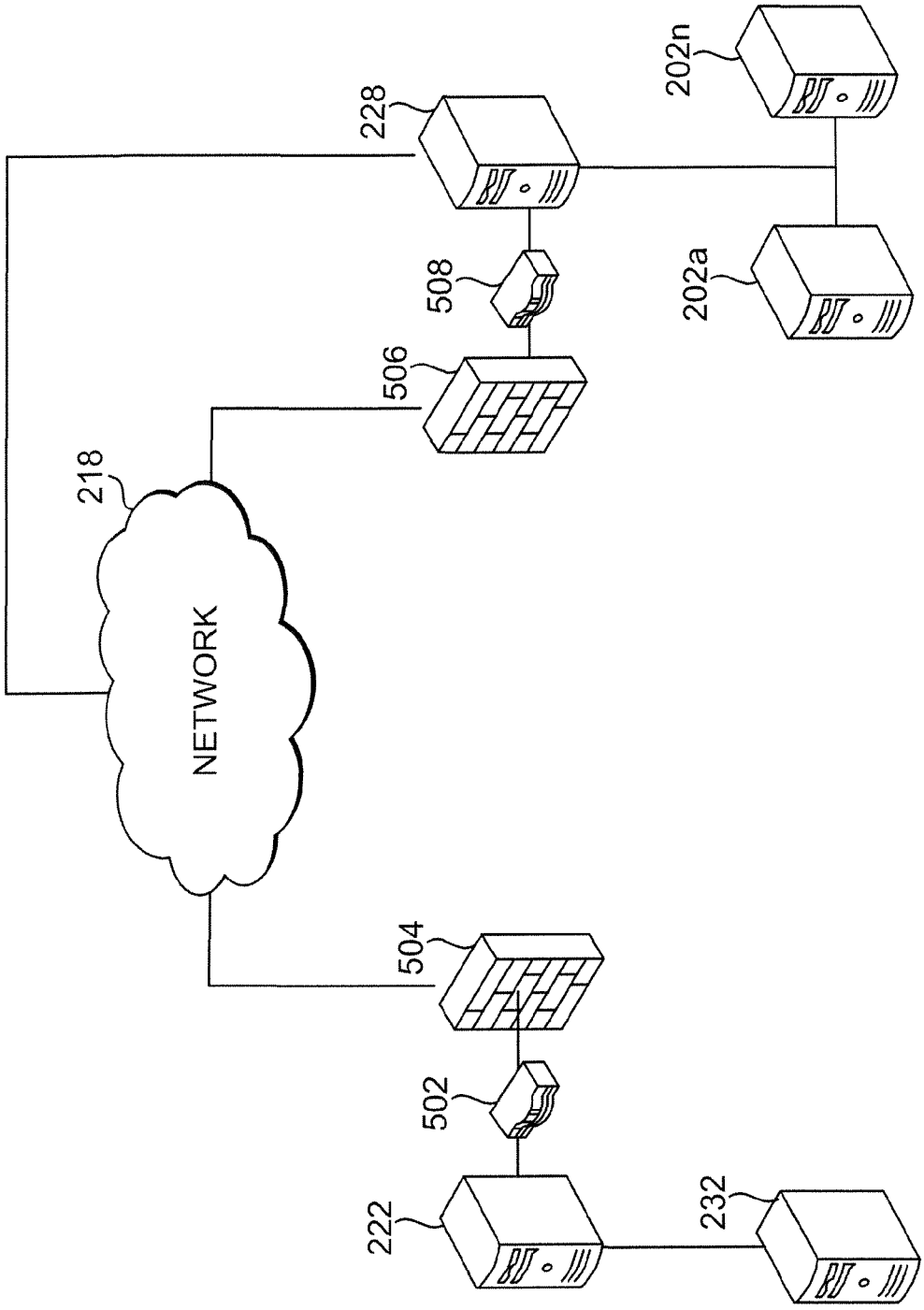

FIG. 5

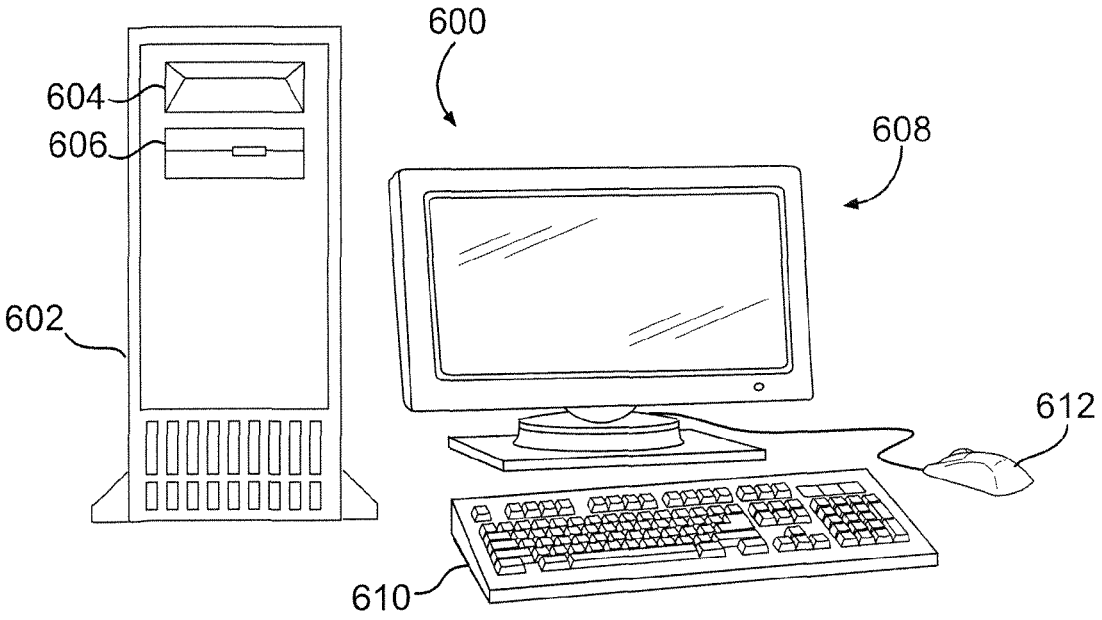

FIG. 6

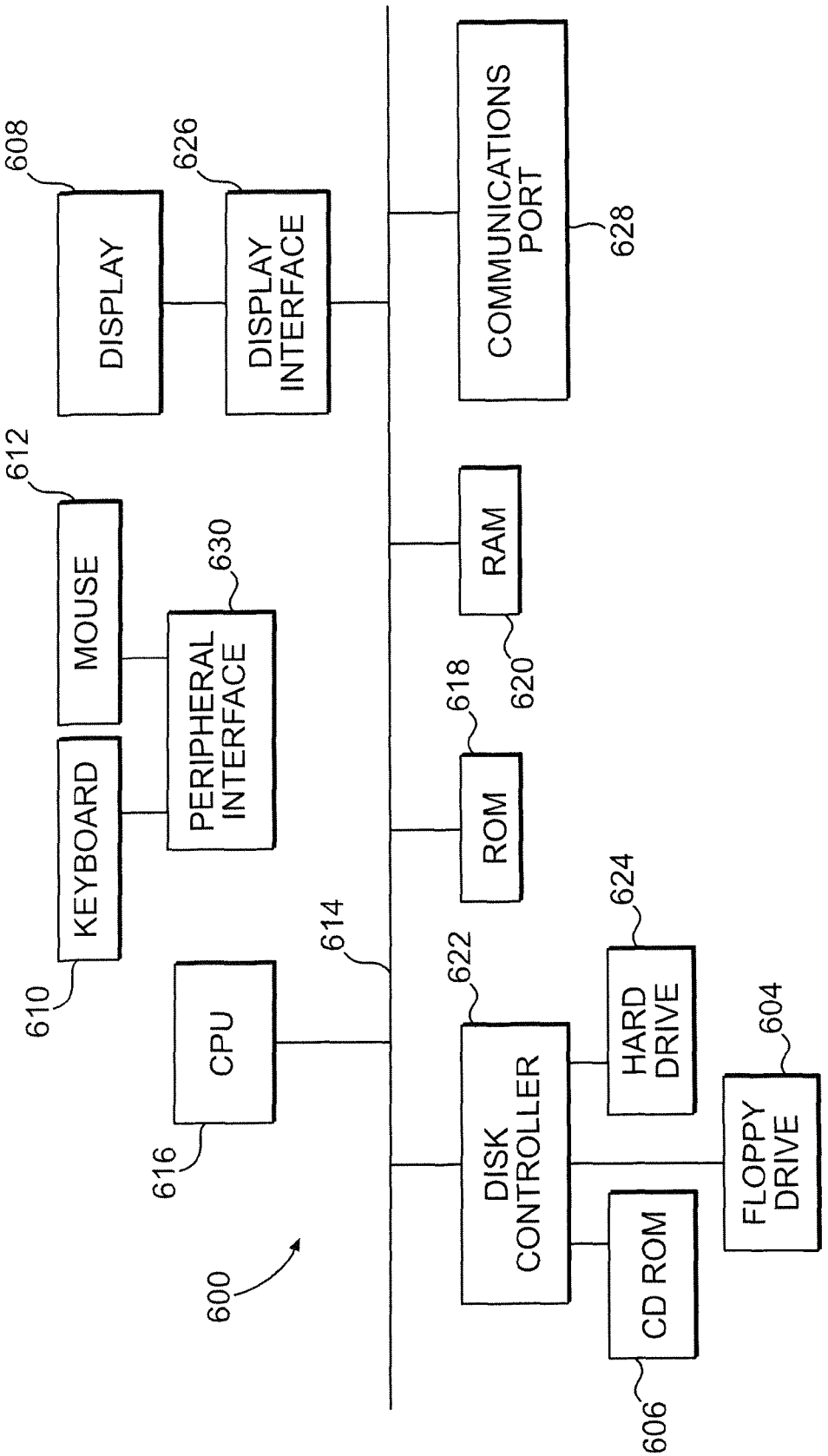
600
CPU
616
614
KEYBOARD
610
MOUSE
612
PERIPHERAL INTERFACE
630
DISPLAY
608
DISPLAY INTERFACE
626
COMMUNICATIONS PORT
628
RAM
620
ROM
618
DISK CONTROLLER
622
HARD DRIVE
624
FLOPPY DRIVE
604
CD ROM
606

FIG. 7

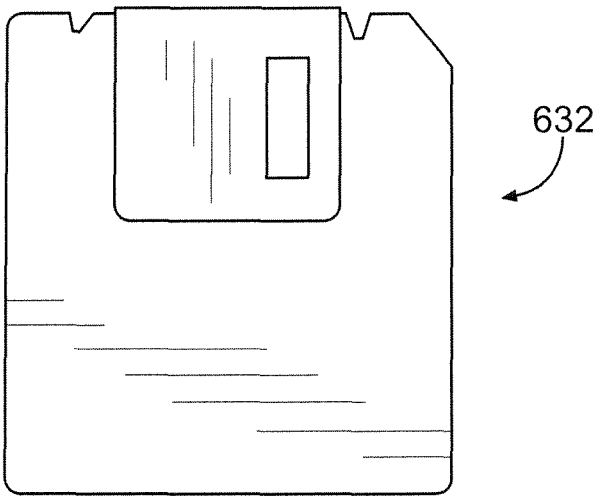

FIG. 8

SYSTEMS AND METHODS FOR RAPID DELIVERY OF TIERED METADATA

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation, and claims the benefit under 35 U.S.C. §120 of U.S. patent application Ser. No. 12/232,312, filed Sep. 15, 2008, which is herein incorporated by reference in its entirety.

FIELD OF EMBODIMENTS OF THE INVENTION

Embodiments of the present invention generally relate to rapid delivery of media content via one or more networks and, more particularly, to rapidly searching electronic media content and transmitting at least two sets of metadata associated with the electronic media content.

BACKGROUND OF EMBODIMENTS OF THE INVENTION

The advent of modern computing and networking technologies has brought about an explosion of information that is becoming more and more available to the public. Widespread access to networks, such as the Internet and Intranets, has fueled robust growth in demand for both media content and delivery channels which, in turn, has increased the desire for rapid access to news and information, local content such as emails and electronic documents, and metadata pertaining thereto. Metadata is generally defined as "data about data." In a content management and information architecture, metadata generally refers to information about objects, such entities. Thus, metadata can pertain to information about a document, an image, news stories, information on blogs, and so on.

A number of vendors, organizations, consortiums, international standards bodies, and working groups are developing (or have developed) metadata recommendations and standards. For example, the IFLA (The International Federation of Library Associations and Institutions), is an international body representing the interests of library and information services and their users. See IFLA website. The IETF (Internet Engineering Task Force) has a number of projects underway to define metadata usage on the Internet and Web, such as the Common Indexing Protocol (CIP), and the URN (Uniform Resource Name).

The Handle System® is a distributed computer system which stores names, or handles, of digital items and which can quickly resolve those names into the information necessary to locate and access the items. It was designed by CNRI (Corporation for National Research Initiatives®) as a general purpose global system for the reliable management of information on networks such as the Internet over long periods of time and is currently in use in a number of prototype projects, including efforts with the Library of Congress, the Defense Technical Information Center, the International DOI® (Digital Object Identifier) Foundation, and the National Music Publishers' Association.

In addition, the World Wide Web Consortium's (W3C) Metadata Activity Group is developing ways to model and encode metadata. The group has developed RDF (Resource Description Framework) and PICS (Platform for Internet Content Selection). See World Wide Web Consortium's website information pertaining to metadata. Finally, the Dublin Core is an attempt at standardizing a core set of metadata elements. RFC 2413 (Dublin Core Metadata for Resource Discovery, September 1998) describes the metadata elements. See Dublin Core website.

Descriptive metadata may describe information that identifies resources that enable searching and retrieving at the web-level. For example, descriptive metadata may be used to facilitate searching the Web to find an image collection pertaining to major league baseball players, and/or enable users to discover resources pertaining to digitized collections of information pertaining to the Civil War. Structural metadata may be used to facilitate navigation and presentation of electronic resources, and provide information about the internal structure of resources including page, section, chapter numbering, indexes, and table of contents. Structural metadata may also be used, for example, to describe relationships among materials (e.g., photograph B was included in manuscript A) and/or bind related files and scripts (e.g., File A is the JPEG format of the archival image File B).

The ability to quickly gather large amounts of unstructured content, such as news information, emails, and locally stored electronic documents and content, and distribute relevant information to end-users may provide a competitive advantage to such end users. For example, providing metadata pertaining to financial news stories to end users in a rapid manner may enable end users to acquire and use this information before others can gain access to and react to the information.

There are known systems that have been utilized in efforts to rapidly provide metadata to end users. Typically, these schemes complete the entire formation of metadata before transmitting any metadata to client computers or processing devices.

Aspects of the present invention are directed to formulating metadata pertaining to unstructured content such as news information, emails, and locally stored electronic documents, and to providing staged delivery of metadata, with each stage providing an increasing amount of metadata content, for example, to client computers and/or end-users in a manner that overcomes certain limitations associated with known systems and methods.

SUMMARY OF EMBODIMENTS OF THE INVENTION

Embodiments of the present invention are directed to expanding the capability of generating metadata associated with unstructured content such as news stories, instant messaging records, emails, blog content, and so on. Aspects of various embodiments of the present invention add classification or categorization scheme topic codes, for example, to unstructured electronic content such as news stories and emails, as well as provide metadata classification or categorization in connection with entity and fact extraction. These processes are performed in a manner that does not add significant latency prior to transmitting, for example, the categorization-related metadata, entity-related metadata and fact-related metadata as they each become available, to end users, client systems and/or other computing devices such as a cell phone or personal digital assistant.

Embodiments of the present invention are also directed to providing tiered transmission of increasing amounts of metadata to end users, client systems and/or other computing devices such as a cell phone or personal digital assistant. The metadata can correspond to a classification or categorization of subject matter within a document such as a news story or an email. The metadata can also be associated with or correspond to entities within the news story or email, and facts within the news story or email. Embodiments of the invention

are directed to providing to end users, client systems and/or other computing devices respectively increasing amounts of metadata associated with each of the subject matter, entities and facts within, for example, a news story, email, or any other form of written text.

Embodiments of the present invention are also directed to providing metadata "on-demand," so that as the metadata is made available, the client application will be able to retrieve it. Embodiments of the invention also enable client-side control of the trade-off between the amount of metadata provided and the speed at which the client-side receives the metadata.

In one embodiment of the present invention, a computer-implemented method includes receiving a set of alphanumeric information (e.g., an e-mail, an instant message, or an electronic document), generating a first set of metadata associated with the alphanumeric information, generating a second set of metadata associated with the alphanumeric information, and transmitting the first set of metadata at a first time and the second set of metadata at a second time. The alphanumeric information can be a news story, such a new story related to and/or include financial information. The second time will generally be no later than one hour after the first time. In another embodiment, the second time is no later than five seconds after the first time.

The first set of metadata can pertain to a subject matter of the alphanumeric information, and the second set of metadata can pertain to an entity identified within the alphanumeric information. The first set of metadata can cause execution of an automated security trade. The second set of metadata can also cause execution of an automated security trade.

A third set of metadata can be generated that is associated with the alphanumeric information. The third set of metadata can be transmitted at a third time subsequent to the second time. The third set of metadata can cause execution of an automated security trade.

In another embodiment of the present invention, a system includes a computer configured for receiving a set of alphanumeric information, generating a first set of metadata associated with the alphanumeric information, generating a second set of metadata associated with the alphanumeric information, and transmitting the first set of metadata at a first time and the second set of metadata at a second time.

The first set of metadata can pertains to a subject matter of the alphanumeric information, and the second set of metadata can pertain to an entity identified with the alphanumeric information. The computer can transmit the first set of metadata using, for example, a network, to a second computer that triggers a security trade based on the first set of metadata.

The first computer can transmit the second set of metadata to a second computer, and the second computer can trigger a security trade based on the second set of metadata. The second time can be no later than 5 seconds after the first time.

The first computer can also transmit a third set of metadata associated with the alphanumeric information to a second computer, and the second computer can trigger a second security trade based on the third set of metadata.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exemplary block diagram illustrating aspects of an example of unstructured text that can be processed by various embodiments of the present invention.

FIG. **2** is an exemplary block diagram that also serves as a flow diagram, illustrating aspects of media content flow and metadata characterization that can be performed by various embodiments of the present invention.

FIG. **3** is an example of unstructured text in the form of a news story, and also illustrates an example of categorization topics, entities, and facts that can be used in conjunction with metadata characterization in accordance with various embodiments of the present invention.

FIG. **4** is an example of a sequence diagram of an embodiment of the invention, illustrating an exemplary message flow between a trading system, a client computer, a metadata module, and a news source.

FIG. **5** is an exemplary network configuration that can be utilized to implement aspects of the present invention.

FIG. **6** is an illustrative embodiment of a computer and assorted peripherals.

FIG. **7** is an illustrative embodiment of internal computer architecture consistent with the instant invention.

FIG. **8** is an illustrative embodiment of a memory medium.

DESCRIPTION OF EMBODIMENTS OF THE INVENTION

FIG. **1**, generally at **100**, is an exemplary block diagram illustrating aspects of an example of unstructured text **102** that can be processed by various embodiments of the present invention. The unstructured text **102** could be a news story that is provided from any number of sources, such as newspapers, magazines, professional journal articles, transcriptions of speeches, live proceeding or hearings, news conferences, and the like. The unstructured text **102** could also be, for example, an email, a blog posting, or a translation of a speech, or any other form of written text. The unstructured text **102** can pertain or relate to any subject matter. For example, the unstructured text **102** could pertain or relate to business information, financial information, actual and/or expected corporate earnings, real estate information, personal finance information, tax planning information and/or strategies, investment opportunities, legal and/or regulatory developments, sports, and the like.

As shown, unstructured text **102** may include various elements, such as a subject line or headline **104**, a story body **106**, and metadata **108**. Subject line or headline **104** includes the subject line or headline of an unstructured text **102** item, and story body **106** includes the actual words (text) of the unstructured text **102**. Metadata **108** includes information about the unstructured text **102**, such as the number of words in the unstructured text **102**, the author of the unstructured text **102**, the time and date of transmission of the unstructured text **102**, the publication source (e.g., the New York Times, the Economist magazine), whether the unstructured text **102** is streamlined and/or transcribed text from a corporate earnings conference, the originating source of the unstructured text **102**, and/or a unique identifier associated with the unstructured text **102**.

FIG. **2**, generally at **200**, is an exemplary block diagram that also serves as a flow diagram, illustrating aspects of media content flow and metadata characterization that can be performed by various embodiments of the present invention. News sources **202** such as Associated Press (AP), Thomson Reuters and/or United Press International (UPI) will typically receive and transmit unstructured text **102**, for example, in the form of a news story to metadata module **206** via communication links **204***a-n*.

One or more of any particular news source(s) **202** can transmit any number of new stories **102** at any instant in time. For example, UPI may be transmitting, for example, five, ten, twenty, fifty, or more, news stories **102** from news source **202** to metadata module **206** at any point in time. At the same instant (or range) of time, Associated Press and/or Reuters

may also be transmitting, for example, five, ten, twenty, fifty, or more, news stories **102** from news source **202** to metadata module **206** at any point in time. Communication links **204***a-n* represent a plurality of communication links that may be used to receive news stories **102** from a plurality of news sources **202**.

Metadata module **206** includes (or utilizes) a general purpose computer **228**, which is used to perform processing associated with categorization coding module **208**, entity extraction module **210**, and fact extraction module **212**. Other tiered metadata modules can be utilized in addition to or in lieu of categorization coding module **208**, entity extraction module **210**, and fact extraction module **212**. Examples of such modules can be a language identification module (not shown) that can identify the language of a particular word, phrase, portion of an unstructured text **102** document, or an entire unstructured text **102** document. Similarly, a sentiment analysis module (not shown) can be utilized that can identify the tone of a portion of or an entire unstructured text **102** document (e.g. optimistic, pessimistic, request for information, recommended course of action, and so on).

Computer **228** can be a general purpose computer having, for example, an Intel 2x dual core central processing unit (CPU) and 6 Gigabytes of random access memory (RAM). Computer **228** could also be a general purpose computer having, for example, two Quad core CPU's and 16 Gigabytes of RAM. Computer **228** can run one or more commercially available software packages such as Clearforest Tags, Clearforest Tags Console, Clearforest Categorization Manager, Microsoft SQL Server 2005, Windows Server 2003 and/or Java Development Kit 6 to perform certain functionality associated with metadata module **206**, as will be described herein. Computer **228** can receive unstructured text **102** from news sources **204***a-n*. In addition, computer **228** may scan, for example, the World Wide Web (WWW) for blogs, news stories or content, and other web content that is to be processed by metadata module **206**.

Within metadata module **206**, news story **102** is initially processed by categorization coding module **208**. Within categorization coding module **208**, the news story **102** is initially assigned (or may already have) a unique identifier, such as an alphanumeric identifier that may be part of metadata **108**. Categorization coding module **208** processes the content of news stories **102**, and attaches or assigns topic codes to each story **102**. Topic codes generally relate to subject matter contained in a story, as will described in connection with FIG. **3**. For example, a topic code of MER may be used to indicate that subject matter within a news story **102** pertains to a merger between two companies. Any number of topic codes may be assigned to associated with a particular news story **102**.

When system **200** receives news stories **102** from news sources **202**, news stories are typically transmitted by news sources **202** in a variety of formats. For example, one news source **202** provider (e.g., Associated Press) may include all metadata **108** in a single field, whereas another news source **202** provider (e.g., Reuters) may have separate data fields for metadata **108**. As an example, Reuters may have separate, dedicated data fields for each of the number of words in the news story **102**, the author(s) of the news story **102**, and the time and date of transmission of the news story **102**. Accordingly, categorization coding module **208** (or other hardware and/or software) may need to perform data normalization so that categorization coding module **208**, entity extraction module **210**, and fact extraction module **212** receive and process news story **102** data in a common format.

Categorization coding module **208** may utilize any public or private classification scheme or ontology. For example, categorization coding module **208** may utilize The Open Directory Project (see, www.dmoz.org). As another example, the FTSE (Financial Times and the London Stock Exchange (UK stock index)) Global Classification System for the global equities markets may be used as a classification system. Categorization coding module **208** may also use conventional classification techniques such as hierarchies and ordered lists.

The topic codes generated by categorization coding module **208** are stored in an metadata archive **214**. Accordingly, in embodiments of the present invention, the derived, distilled and/or extracted information from a news story **102**, such as categorization coding, identification of entities, and identification of facts and events extracted from a news story **102**, as will be described, for example, in connection with FIG. **3**, are also considered metadata. Relationships between such derived, distilled and/or extracted information from a news story **102**, as will also be described, for example, in connection with FIG. **3**, are also considered as metadata.

Categorization coding module **208** may also generate a unique identifier for a news story **102** if the news story is not transmitted with a unique identifier as part of metadata **108**. For example, referring to FIG. **1**, a unique identifier may be provided as part of metadata **108**, and transmitted to metadata module **206** from a news source **202**. When utilizing an off-the shelf financial or business extraction module such as the financial/business or intelligence extraction modules provided by ClearForest (a Thomson Reuters company), Waltham, Mass., the average processing time to assign topic codes and, if necessary, a unique identifier to a typical 4 kilobyte a news story **102** is expected to be approximately 170 ms.

After categorization coding module **208** processes a news story **102**, entity extraction module **210** processes the content of news stories **102** and the topic codes determined by categorization coding module **208**, and determines (or defines) entities within a news story **102** that are relevant and/or can be associated with the topic codes. Entities are concepts or set of terms of particular interest, such as a person, company, organization, product, location such as a country, city and/or state, or technology. The entities generated by entity extraction module **210** are stored in an metadata archive **214**. When utilizing an off-the shelf financial or business extraction module, the average processing time to assign entities to a typical 4 kilobyte a news story **102** is expected to be approximately 300 ms.

After categorization coding module **208** and entity extraction module **210** process a news story **102**, the topic codes and entities applicable to a news story **102** are processed by fact extraction module **212**. Facts are relationships held between two or more entities, such as, for example, the position of a person in a company, or the relationship between two or more companies in a merger or alliance. Each fact has its own set of attributes, and is created by using the metadata and entities that are extracted from each news story **102**. The facts generated by fact extraction module **212** are stored in an metadata archive **214**.

Fact extraction module **212** processes the content of news stories **102**, the topic codes determined by categorization coding module **208**, and the entities determined by entity extraction module **210**, and determines facts within a news story **102** that are relevant to the topic codes and entities. When utilizing an off-the shelf financial or business extraction module, the average processing time to assign entities to a typical 4 kilobyte a news story **102** is expected to be approximately 500 ms.

Metadata archive **214** can include a first section or portion for storing categorization topics, a second section or portion for storing entities, and a third section or portion for storing facts. The first sections (or portions) of metadata archive **214** can by physically or logically separate. For example, three separate repositories **214** could be utilized, with a first repository **214***a* (not shown) used to store topics, a second repository **214***b* (not shown) can be used to store entities, and a third repository **214***c* (not shown) can be used to store facts. Metadata archive **214** could also have one or more logical sections that store topics, one or more logical sections that store entities, and/or one or more logical sections that store facts. Upon completion of processing of a news story **102**, the topics, entities and facts that were respectively transmitted upon completion of processing and temporarily stored in metadata archive **214** can be transmitted to client computer **222** via network **218**, and stored in client metadata archive **226**. Client metadata archive **226** will generally also store a unique identifier that is associated with each news story **102** (or other unstructured text processed by metadata module **206**). Computer **228** can access metadata archive **214** and web service/logic module **216**, for example, to transmit the metadata associated with each news story **102** that is generated by categorization coding module **208**, entity extraction module **210** and fact extraction module **212** to client metadata archive **226**.

In operation, one or more users **220**, such as an end user or a system administrator, may use a general purpose computer as a client computer **222** to determine the level of metadata that they wish to receive. In particular, in accordance with one aspect of the invention, a user **220** can specify the manner in which s/he wishes to receive metadata. For example, for time critical applications such as automated stock trades or security trades based on transmitted metadata, the user **220** can specify that, for a given news story **102**, metadata module **206** should first transmit to client computer **222** the metadata generated by categorization coding module **208**, next transmit to client computer **222** the metadata generated by entity extraction categorization coding module **210**, and finally transmit to client computer **222** the metadata generated by fact extraction coding module **212**. In such an implementation, client computer **222** can execute (and/or or provide instructions and/or triggers for execution of) certain stock or security trades based upon the metadata initially received from categorization coding module **208**, and subsequently execute (and/or or provide instructions and/or triggers for execution of) additional stock or security trades based on the metadata received at a later time from entity extraction module **210**. Finally, client computer **222** can execute (and/or or provide instructions and/or triggers for execution of) certain stock or security trades based upon the metadata received from fact extraction module **212**.

Similarly, if receiving metadata from each of the categorization coding module **208**, entity extraction module **210**, and fact extraction module is not time critical, the user **220** could specify that for a given news story **102**, that metadata module **206** should transmit to client computer **222** the metadata generated by categorization coding module **208**, entity extraction coding module **210**, and fact extraction module **212** all at once, upon completion of processing by fact extraction module **212**.

FIG. **3** is an example of unstructured text in the form of a news story **102**, and also illustrates an example of categorization topics, entities and facts that can be generated by categorization coding module **208** and used in conjunction with metadata characterization in accordance with various embodiments of the present invention. News story **102***a* contains a headline **104**, a story body **106**, and a unique story identifier (UID) **301**. As shown in FIG. **3**, categorization module **208** generates the topics of Recommendation **208***a* and Airline Transport **208***b*, and uses the UID **301** of a12b3212f that is associated with the news story **102**.

Entity extraction module **210** generates the entities of company **210***a* and **210***b*, person **210***c*, and city **210***d*. Entity extraction module **210** also uses the UID **301** of a12b3212f that is associated with the news story **102**. Finally, fact extraction module **212** generates facts pertaining to Analyst Recommendation **212***a*. Within the Analyst Recommendation **212***a*, there are facts pertaining to source **212***b*, rated **212***c*, trend **212***d*, and newrank **212***e*. Fact extraction module **212** also uses the UID **301** of a12b3212f that is associated with the news story **102**.

As noted above, each fact has its own set of attributes, and is created by using the metadata and entities that are extracted from each news story **102**. For example, the rated UPS Inc. fact as shown at **212***c* in FIG. **3** stems from UPS Inc. as being identified as a company by entity module **210**, as shown in FIG. **3** at **210***a*.

In operation of one embodiment of the present invention, as topics **208***a* and **208***b* are generated by categorization coding module **208**, they can be stored in metadata archive **214**, and transmitted to client computer **222** via web service/logic module **216**, and network **218**. Client computer **222** can run a client application software package **230**, that can determine, for example, whether client computer **222** should automatically execute (and/or or provide instructions and/or triggers for execution of) a stock trade based on the topics received by client computer **222**. Techniques such as standard tracking of event timelines and trends can be utilized to facilitate determination of whether client computer **222** should automatically execute (and/or or provide instructions and/or triggers for execution of) a stock trade based on the topics received.

For example, client application **230** can determine, for example, whether a topic such as Airline Transport **208***b* is currently receiving a statistically significant increase (or decrease) of mentioning. Client computer **222** could, for example, automatically execute a trade (and/or or provide instructions and/or triggers for execution of) to buy or sell a predetermined volume of Airline-related stock based on a statistically significant (e.g., 10%) increase (or decrease) of topics pertaining to Airline Transport **208***b*, relative to historical patterns. In addition to or in lieu of client computer **222** executing trades (and/or or provide instructions and/or triggers for execution of), client computer **222** could also send alerts to predetermined individuals and/or organizations based on a statistically significant increase or decrease in mentioning of Airline-related topics.

Similarly, client application **230** can use entity-related criteria, such as whether a particular company is currently receiving a predetermined statistically significant increase (or decrease) of mentioning relative to historical patterns. Client computer **222** could, for example, automatically execute a trade (and/or or provide instructions and/or triggers for execution of) to buy or sell a predetermined volume of stock pertaining to the particular company **210***a*, **210***b* based on a statistically significant increase (or decrease) of references to that company.

In addition to or in lieu of client computer **222** executing trades (and/or or provide instructions and/or triggers for execution of), client computer **222** could also send alerts to predetermined individuals and/or organizations based on the statistically significant increase or decrease in references to a particular company. For example, if a particular company has had a recent spate of bad news, and the number of references

to the company decreases due to a decline in the popularity of its products or services, this could trigger, for example, a sale of the company's stock and/or an alert to specified organizations and/or individuals.

Similarly, client application **230** can use criteria such as whether facts pertaining to a trend **212***d* (e.g., a fact of Downgraded corresponding to trend **212***d*, as shown in FIG. **3**) or how a company is rated **212***c*. Client computer **222** could, for example, automatically execute a trade (and/or or provide instructions and/or triggers for execution of) to sell a predetermined volume of stock pertaining to the particular company **210***a*, **210***b* based on a fact of Downgraded corresponding to trend **212***d*, and/or provide an alert to specified organizations and/or individuals.

Client metadata archive **226** can store the data respectively generated by categorization coding module **208**, entity extraction module **210** and fact extraction module **212** for future use. For example, major companies and large organization typically have, for example, hundreds of thousands of documents on proprietary Intranets. As these networks grow over time it becomes increasing difficult to search and navigate. The metadata module **206** of the present invention will enable such organization to create structure and allow important information pertaining to categorization topics, entities and facts to surface, as illustrated in FIG. **3**. For example, client application **230** may be used to query multiple unstructured text **102**, such as emails, instant messaging traffic, transcripts of speeches, and news feeds for entity information pertaining to a particular company **210***a* (e.g., UPS Inc) and fact information pertaining to a trend **212***d* for that company (e.g., downgraded).

Since all unstructured text **102** will be processed by the metadata module **206**, metadata module **206** will generally utilize the same process and therefore provide consistent metadata across all unstructured text **102** sources. This feature pertaining to one aspect of the invention will advantageously allow and provide integration of searching and alerting, as well facilitating the provision of uncovering and retrieval of information patterns across the various forms of unstructured data **102**.

FIG. **4**, generally at **400**, is a sequence diagram of an embodiment of the invention, illustrating an exemplary runtime scenario of a message flow between a trading computer **232**, a client application **230** running in client computer **222**, metadata module **206** running on computer **228**, and news sources **202**. In the sequence diagram **400** shown in FIG. **4**, the horizontal dimension is used to represent message flow and the top-to-bottom vertical dimension is used to represent time.

More particularly, trading computer **232** will transmit a metadata watch **404** to client computer **222**. In response to the received metadata watch **404**, client computer **222** can initiate a content query **406** with client application **230** running on client computer **222**. Metadata module **206** will provide the metadata of the news sources **202** to client application **230**. Client application **230** then, in turn, will process the query from trading computer **232** and metadata from metadata module **206** to trigger the trading signal to trading computer **232**. In FIG. **4**, client computer **222** has initiated a content query pertaining to news stories **102** whose subject matter pertains or relates to energy in the middle east in connection with Exxon Corporation. Clearly, any number criteria can be specified in either the metadata watch **404** or the content query **406**. That is, trading computer **232** can transmit any number of metadata watches to client computer **222**. Similarly, client computer **222** can also transmit any number of content queries **406** to computer **228**.

Upon receipt of a content query **406**, metadata module **206** running on computer **228** will transmit an alert **410** to client computer **222** regarding any news stories **102** that contain content that match or correspond to a content query **406**. Computer **228** initially transmits a confirmation **408** to client computer **222**, indicating that computer **228** has received and will act upon the content query **406** transmitted by client computer **222** to computer **228**.

Upon transmission of the confirmation request **408** by computer **228** to client computer **222**, metadata module **206** commences processing of unstructured text, such as a news stories **102**, transmitted to computer **228**, in accordance with the content query **406**. As news stories **102** are received by computer **228**, as shown at **412**, categorization module **208** will identify whether the headline data **104** and/or story body **106** match or correspond to a content query **406**. Computer **228** could transmit, for example, the headline data **104** and a link to the news story **102** to client computer **222**, as indicated at **414**. Computer **228** will also utilize categorization module **208** to transmit to client **222** the categorization metadata associated with the news story **102**, as indicated at **416**. The categorization metadata will be stored in metadata archive **214**, and client metadata archive **226**, as described in connection with FIG. **2**.

As shown at **416**, client computer **222** receives categorization metadata associated with the news story **102**, as determined by categorization metadata module **208**. Using the categorization metadata, client computer **222** can determine whether to initiate a trade based on the content of the categorization metadata associated with news story **102**. If client computer **222** determines that a trade should be initiated, client computer **222** can transmit a trading signal **418** to trading computer **232**. For example, client application **230** shown in FIG. **2** can determine, for example, whether a topic such as energy in the middle east is currently receiving a statistically significant increase (or decrease) of mentioning. Client computer **222** could, for example, provide instructions to execute a trade as indicated by trading signal **418** to buy or sell a predetermined volume of Exxon (or other) stock based on a statistically significant (e.g., 10%) increase (or decrease) of topics pertaining to energy in the middle east, relative to historical patterns. In addition to or in lieu of client computer **222** transmitting a trading signal **418** to trading computer **232**, client computer **222** could also send alerts to predetermined individuals and/or organizations based on a statistically significant increase or decrease in mentioning of a topic such as energy in the middle east.

Entity extraction module **210** also processes unstructured text, such as a news stories **102**, transmitted to computer **228**, in accordance with the content query **406**. As news stories **102** are received by computer **228**, as shown at **412**, entity extraction module **210** will identify the subject matter associated with the headline data **104**, and will also identify any entities, such as a corporation of individual, found in the headline data **104** and/or story body **106** that match or correspond to a content query **406**. Computer **228** will utilize entity extraction module **210** to transmit to client **222** the entity metadata associated with the news story **102** that matches or corresponds to a content query **406**, as shown at **420**. The entity metadata will be stored in metadata archive **214**, and client metadata archive **226**, as described in connection with FIG. **2**.

As shown at **420**, client computer **222** receives entity metadata associated with the news story **102**, as determined by entity metadata module **210**. Using the entity metadata, client computer **222** can determine whether to initiate a trade based on the combined content of the entity metadata and categorization metadata associated with news story **102**. If client

computer **222** determines that a trade should be initiated, client computer **222** can transmit a trading signal **422** to trading computer **232**. For example, client application **230** shown in FIG. **2** can determine, for example, whether a topic such as energy in the middle east in connection with Exxon Corporation is currently receiving a statistically significant increase (or decrease) of mentioning. Client computer **222** could, for example, provide instructions to execute a trade as indicated by trading signal **422** to buy or sell a predetermined volume of Exxon stock based on a statistically significant (e.g., 10%) increase (or decrease) of topics pertaining to energy in the middle east in connection with Exxon Corporation, relative to historical patterns. In addition to or in lieu of client computer **222** transmitting a trading signal **422** to trading computer **232**, client computer **222** could also send alerts to predetermined individuals and/or organizations based on a statistically significant increase or decrease in mentioning of a topic such as energy in the middle east in connection with Exxon Corporation.

Fact extraction module **212** also processes unstructured text, such as a news stories **102**, transmitted to computer **228**, in accordance with the content query **406**. As news stories **102** are received by computer **228**, as shown at **412**, fact extraction module **212** will identify facts that match or correspond to a content query **406**. Computer **228** will utilize fact extraction module **212** to transmit to client computer **222** the fact metadata **424** associated with the news story **102**. The fact metadata will be stored in metadata archive **214**, and client metadata archive **226**, as described in connection with FIG. **2**.

As shown at **424**, client computer **222** receives fact metadata associated with the news story **102**, as determined by fact metadata module **212**. Using the fact metadata in combination with the entity metadata and categorization metadata, client computer **222** can determine whether to initiate a trade based on the combined content of the fact metadata, entity metadata and categorization metadata that is associated with a news story **102**. If client computer **222** determines that a trade should be initiated, client computer **222** can transmit a trading signal **426** to trading computer **232**.

For example, client application **230** shown in FIG. **2** can determine whether to execute a trade, for example, based on a topic such as energy in the middle east in connection with fact metadata derived from the news story **102**, indicating that Exxon Corporation is currently decreasing oil exploration in the middle east. Client application **230** could use the categorization metadata, the entity metadata, and the fact metadata to determine whether to execute a trade, as indicated by trading signal **426**, to buy or sell a predetermined volume of Exxon stock based on a statistically significant (e.g., 10%) increase (or decrease) of topics pertaining to energy in the middle east in connection with Exxon Corporation, relative to historical patterns, in combination with the fact metadata indicating that Exxon is currently decreasing oil exploration in the middle east. In addition to or in lieu of client computer **222** transmitting a trading signal **426** to trading computer **232**, client computer **222** could also send alerts to predetermined individuals and/or organizations based on a statistically significant increase or decrease in mentioning of a topic such as energy in the middle east in connection with the fact metadata indicating that Exxon Corporation is currently decreasing oil exploration in the middle east.

FIG. **5** is an exemplary network configuration that can be utilized to implement aspects of the present invention. A potential operational scenario is described as follows. As described in connection with FIG. **4**, trading computer **232** will transmit a metadata watch **404** to client computer **222**. In response to the received metadata watch **404**, client computer **222** can transmit one or more content query **406** of interest to metadata module **206** running on general purpose computer **228**. For example, a content query can pertain or relate to energy in the middle east in connection with Exxon Corporation. In turn, metadata module **206** will transmit alerts on specific content categories onto a queue of the client computer **222**, as indicated at **414**, **416**, **420** and **424**.

Client computer **222** can establish a stateful connection between computer **228** and client computer **222** using network **218**. Network **218** can be, for example, a wide area network (WAN), a virtual private network (VPN) and/or private line to establish a direct point to point data connection with computer **228** for higher speeds and lower latency. Client computer **222** monitors an incoming message queue for new alerts from computer **228**, which runs metadata module **206**, based on a query for a specific content query.

News source computers **202***a-n* can include content from, for example, the web, an in-house editorial system, and/or a third party system such as Reuters or Associated Press. As computer **228** receives unstructured text **102** from news source computers **202***a-n*, metadata module **206** will process the metadata associated with each item of unstructured text **102**. As content **102** arrives at computer **228**, computer **228** will transmit an initial alert, as shown at **414**, to client computer **222** containing the raw data and a unique ID **301** for the content item, as indicated at **414**. Computer **228** may also transmit one or more alerts to client computers **222** based on one or more content queries **406** associated with each respective client computer **222**. The alerts are shown at **416**, **420** and **424**.

For example, as categorization coding module **208** completes generation of metadata for an item of unstructured text **102**, computer **228** will transmit a first set of metadata (e.g. categorization metadata) with a unique ID **301**, as shown at **416**. Similarly, as entity extraction module **210** completes generation of metadata for the same item of unstructured text **102**, computer **228** will transmit a second set of metadata (e.g. entity metadata) with the same unique ID **301**, as shown at **420**. Finally, as fact extraction module **212** completes generation of metadata for the same item of unstructured text **102**, computer **228** will transmit a third second set of metadata (e.g. fact metadata) with the same unique ID **301**, as shown at **424**. Client computer **222** may use any combination of metadata **416**, **420**, **424**.

Upon receipt of data **414** pertaining to unstructured text **102** and metadata **416**, **420**, **424**, client computer **222** may use the data **414** and/or metadata **416**, **420**, **424** to determine whether to transmit trading signals to **418**, **422**, **426** to trading computer **232**. Upon receipt of a trading signal **418**, **422**, **426**, trading computer **232** can initiate trades, for example of stocks, bonds or other financial securities based on trading signals **418**, **422** and/or **426**.

As shown in FIG. **5**, client computer **222** can use standard networking equipment such as a router **502** and firewall **504** to provide connectivity with network **218**. Similarly, computer **228** can standard networking equipment such as a router **508** and firewall **506** to provide connectivity with network **218**. News source computers **202***a-n* may similarly be operationally connected, via a network, with computer **228**. Similarly, trading computer **232** may be operationally connected, via a network, with client computer **222**.

FIG. **6**, generally at **600**, is an illustration of a main central processing unit for implementing the computer processing in accordance with a computer implemented embodiment of the present invention. The procedures described herein are presented in terms of program procedures executed on, for

example, a computer **228**, **202***a-n*, **222**, **232** or network of computers **218**, such as shown in FIG. **5**.

Viewed externally in FIG. **6**, a computer system designated by reference numeral **600** has a computer **602** having disk drives **604** and **606**. Disk drive indications **604** and **606** are merely symbolic of a number of disk drives which might be accommodated by the computer system. Computer system **600**, or a similar computing system, can be utilized to implement computer **228**, news source computers **202***a-n*, client computer **222**, and/or trading computer **232**. Typically, these would include a floppy disk drive **604**, a hard disk drive (not shown externally) and a CD ROM indicated by slot **606**. The number and type of drives varies, typically with different computer configurations. Disk drives **604** and **606** are in fact optional, and for space considerations, are easily omitted from the computer system used in conjunction with the production process/apparatus described herein.

The computer system **600** also has an optional display **608** upon which information is displayed. In some situations, a keyboard **610** and a mouse **612** are provided as input devices to interface with the central processing unit **602**. Then again, for enhanced portability, keyboard **610** may be a limited function keyboard, or omitted in its entirety. In addition, mouse **612** optionally is a touch pad control device, or a track ball device, or even omitted in its entirety as well. In addition, the computer system **600** also optionally includes at least one infrared transmitter and/or infrared received for either transmitting and/or receiving infrared signals, as described below.

Although computer system **600** is illustrated having a single processor, a single hard disk drive and a single local memory, the system **600** is optionally suitably equipped with any multitude or combination of processors or storage devices. Computer system **600** is, in point of fact, able to be replaced by, or combined with, any suitable processing system operative in accordance with the principles of the present invention, including sophisticated calculators, and hand-held, laptop/notebook, mini, mainframe and super computers, as well as processing system network combinations of the same.

FIG. **7** illustrates a block diagram of the internal hardware of the computer system **600** of FIG. **6**. A bus **614** serves as the main information highway interconnecting the other components of the computer system **600**. CPU **616** is the central processing unit of the system, performing calculations and logic operations required to execute a program. Read only memory (ROM) **618** and random access memory (RAM) **620** constitute the main memory of the computer. Disk controller **622** interfaces one or more disk drives to the system bus **614**. These disk drives are, for example, floppy disk drives such as **604**, or CD ROM or DVD (digital video disks) drive such as **606**, or internal or external hard drives (or disk) **624**. As indicated previously, these various disk drives and disk controllers are optional devices.

A display interface **626** interfaces display **608** and permits information from the bus **614** to be displayed on the display **608**. Again as indicated, display **608** is also an optional accessory. For example, display **608** could be substituted or omitted. Communications with external devices, for example, the components of the apparatus described herein, occurs utilizing communication port **628**. For example, optical fibers and/or electrical cables and/or conductors and/or optical communication (e.g., infrared, and the like) and/or wireless communication (e.g., radio frequency (RF), and the like) can be used as the transport medium between the external devices and communication port **628**. Peripheral interface **630** interfaces the keyboard **610** and the mouse **612**, permitting input data to be transmitted to the bus **614**. In addition to the standard components of the computer, the computer also optionally includes an infrared transmitter and/or infrared receiver. Infrared transmitters are optionally utilized when the computer system is used in conjunction with one or more of the processing components/stations that transmits/receives data via infrared signal transmission. Instead of utilizing an infrared transmitter or infrared receiver, the computer system optionally uses a low power radio transmitter and/or a low power radio receiver. The low power radio transmitter transmits the signal for reception by components of the production process, and receives signals from the components via the low power radio receiver. The low power radio transmitter and/or receiver are standard devices in industry.

Aspects of the process of embodiments of the present invention may be implemented in hardware and/or software form and may, for example, include computer readable program code tangibly embodied in a computer readable medium such as a processor **616**, or memory **618**, **620** coupled to the processor. In other instances, aspects of embodiments of the present invention execute computer readable program code stored on a medium such as a hard drive disk **624**, floppy disk **604**, and/or any other form of memory capable of storing computer readable program code, such as a CD ROM **606**. Certain executable and non-executable portions of the files that are used by embodiments of the invention may be distributed or obtained via a network (e.g., a wireless network) **218**.

FIG. **8** is an illustration of an exemplary memory medium **632** which can be used with disk drives illustrated in FIGS. **6** and **7**. Typically, memory media such as floppy disks, or a CD ROM, or a digital video disk will contain the program information for controlling the computer to enable the various computers, e.g., **232**, **222**, **228**, **202***a-n*, to perform the functions described herein. Alternatively, ROM **618** and/or RAM **620** illustrated in FIGS. **6** and **7** can also be used to store the program information that is used to instruct the central processing unit to perform the operations associated with the production process.

Conventional processing system architecture is more fully discussed in *Computer Organization and Architecture*, by William Stallings, MacMillan Publishing Co. (3rd ed. 1993); conventional processing system network design is more fully discussed in *Data Network Design,* by Darren L. Spohn, McGraw-Hill, Inc. (1993), and conventional data communications is more fully discussed in *Data Communications Principles*, by R. D. Gitlin, J. F. Hayes and S. B. Weinstain, Plenum Press (1992) and in *The Irwin Handbook of Telecommunications*, by James Harry Green, Irwin Professional Publishing (2nd ed. 1992). Each of the foregoing publications is incorporated herein by reference. Alternatively, the hardware configuration is, for example, arranged according to the multiple instruction multiple data (MIMD) multiprocessor format for additional computing efficiency. The details of this form of computer architecture are disclosed in greater detail in, for example, U.S. Pat. No. 5,163,131; Boxer, A., "Where Buses Cannot Go", IEEE Spectrum, February 1995, pp. 41-45; and Barroso, L. A. et al., "RPM: A Rapid Prototyping Engine for Multiprocessor Systems", IEEE Computer, February 1995, pp. 26-34, each of which are incorporated herein by reference.

In alternate preferred embodiments, the above-identified processor, and, in particular, CPU **616**, may be replaced by or combined with any other suitable processing circuits, including programmable logic devices, such as PALs (programmable array logic) and PLAs (programmable logic arrays). DSPs (digital signal processors), FPGAs (field program-

mable gate arrays), ASICs (application specific integrated circuits), VLSIs (very large scale integrated circuits) or the like.

The structures shown and discussed in embodiments of the invention are exemplary only and the functions performed by these structures may be performed by any number of structures. For example, certain functions may be performed by a single physical unit, or may be allocated across any number of different physical units. All such possible variations are within the scope and spirit of embodiments of the invention and the appended claims.

Embodiments of the present invention have been described for the purpose of illustration. Persons skilled in the art will recognize from this description that the described embodiments are not limiting, and may be practiced with modifications and alterations limited only by the spirit and scope of the appended claims which are intended to cover such modifications and alterations, so as to afford broad protection to the various embodiments of invention and their equivalents.

The invention claimed is:

1. A method implemented on a computer system comprising at least one processor and a storage device, comprising:

(a) receiving a set of alphanumeric information on a single storage device;

(b) using a first criteria for processing alphanumeric information and generating metadata to generate a first set of metadata associated with a first subset of the received alphanumeric information;

(c) using a second criteria for processing alphanumeric information and generating metadata different than the first criteria to generate a second set of metadata associated with a second subset of the received alphanumeric information, wherein the first subset of alphanumeric information is different than the second subset of alphanumeric information;

(d) using a third criteria for processing alphanumeric information and generating metadata different than the first criteria and the second criteria to generate a third set of metadata associated with a third subset of the received alphanumeric information, wherein the third subset of alphanumeric information is different than the first and second subsets of alphanumeric information; and

(e) transmitting, to a user computer, the first set of metadata at a first time, the second set of metadata at a second time subsequent to the first time, and the third set of metadata at a third time subsequent to the second time;

wherein at least one of the first set of metadata, the second set of metadata, and the third set of metadata causes an automated transmission of an alert.

2. The method of claim **1**, wherein the alert is automatically transmitted by the user computer.

3. The method of claim **1**, wherein the alert is automatically transmitted to one or more predetermined individuals or organizations.

4. The method of claim **1**, wherein the alert is automatically transmitted in response to a statistically significant change in the at least one of the first set of metadata, the second set of metadata, and the third set of metadata.

5. The method of claim **4**, wherein the statistically significant change is a statistically significant increase or decrease in the metadata relative to historical patterns.

6. A computer system comprising:

a memory; and

a processor in communication with the memory, wherein the computer system is configured for:

receiving a set of alphanumeric information on a single storage device;

using a first criteria for processing alphanumeric information and generating metadata to generate a first set of metadata associated with a first subset of the received alphanumeric information;

using a second criteria for processing alphanumeric information and generating metadata different than the first criteria to generate a second set of metadata associated with a second subset of the received alphanumeric information, wherein the first subset of information is different than the second subset of information;

using a third criteria for processing alphanumeric information and generating metadata different than the first criteria and the second criteria to generate a third set of metadata associated with a third subset of the received alphanumeric information, wherein the third subset of information is different than the first and second subsets of information;

transmitting, to a user computer, the first set of metadata at a first time, the second set of metadata at a second time subsequent to the first time, and the third set of metadata at a third time subsequent to the second time; and

wherein at least one of the first set of metadata, the second set of metadata, and the third set of metadata causes an automated transmission of an alert.

7. The system of claim **6**, wherein the alert is automatically transmitted by the user computer.

8. The system of claim **6**, wherein the alert is automatically transmitted to one or more predetermined individuals or organizations.

9. The system of claim **6**, wherein the alert is automatically transmitted in response to a statistically significant change in the at least one of the first set of metadata, the second set of metadata, and the third set of metadata.

10. The system of claim **9**, wherein the statistically significant change is a statistically significant increase or decrease in the metadata relative to historical patterns.

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